EPA/ROD/R04-94/184
1994

EPA Superfund
Record of Decision:

ALABAMA ARMY AMMUNITION PLANT
EPA ID: AL6210020008
OU 03
CHILDERSBURG, AL
08/30/1994

PB94-964055
EPA/ROD/R04-94/184
September 1994

EPA Superfund
Record of Decision:

Alabama Army Ammunition Plant,
Operable Unit 2, Childersburg, AL,
8/30/1994

<Figure>

U.S. ARMY INSTALLATION
RESTORATION PROGRAM

FINAL
INTERIM
RECORD OF DECISION

ALABAMA ARMY AMMUNITION PLANT
STUDY AREAS 12 AND D OF THE
AREA A SOIL OPERABLE UNIT

AUGUST 1994

In accordance with Army Regulation 200-2, this document is intended by the Army to comply with the National Environmental Policy Act (NEPA) of 1969.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365
AUG 29 1994

4WD-FFB

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Lieutenant Colonel B. L. Martin
Commander, Holston Army Ammunition Plant
ATTN: Pam Wigle
4509 West Stone Drive
Kingsport, TN 37660-9982

SUBJ: Concurrence with Interim Record of Decision for Area A, Operable Unit 2,
Study Areas 12 and D
Alabama Army Ammunition Plant, Childersburg, Alabama

Dear Colonel Martin:

The U.S. Environmental Protection Agency (EPA), Region 4, has reviewed the above referenced decision document and concurs with the Interim Record of Decision (IROD) for Operable Unit 2, Study Areas 12 and D of Area A, as supported by the Remedial Investigation and Baseline Risk Assessment Reports.

The selected remedy is Alternative 1D in the IROD. EPA concurs with the selected remedy as detailed in the IROD with the following stipulations:

1. [Para] 1.5, p. 5 is understood to mean that both present and future uses of the operable unit area are logging and recreation.

2. The remediation level for lead is stipulated to be 500 mg/Kg, notwithstanding that pp. 33, 44, 45, and possibly others refer to the lead remediation level as 200 mg/Kg.

3. It is understood that the selected remedy for Area A, Operable Unit 2, may not be the final remedial action to address all media potentially affected by past disposal practices at this unit.

This action is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action and is cost effective.

Sincerely,

John H. Hankinson, Jr.
Regional Administrator

cc: Richard Isaac, U.S. Army Environmental Center
Kenneth Gray, U.S. Army Corps of Engineers
C.H. Cox, Alabama Department of Environmental Management

INTERIM
RECORD OF DECISION

ALABAMA ARMY AMMUNITION PLANT
STUDY AREAS 12 AND D OF THE
AREA A SOIL OPERABLE UNIT

AUGUST 1994

8/30/94

Lieutenant Colonel B.L. Martin — Date
Commander, Holston Army Ammunition Plant
Commander, Alabama Army Ammunition Plant

U.S. ARMY INSTALLATION
RESTORATION PROGRAM

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LIST OF ACRONYMS AND ABBREVIATIONS

AAAP	Alabama Army Ammunition Plant
AAC	Alabama Administrative Code
ADEM	Alabama Department of Environmental Management
ARAR	applicable or relevant and appropriate requirement
B2EHP	bis(2-ethylhexyl)phthalate
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	chemical of concern
COPC	chemical of potential concern
CPF	cancer potency factor
CSF	carcinogenic slope factor
CRP	Community Relations Plan
13DNB	1,3-dinitrobenzene
DNT	dinitrotoluene
DOD	Department of Defense
DOT	Department of Transportation
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
EQ	ecotoxicity quotient
F	degrees Fahrenheit
FS	feasibility study
gal	gallon
GOCO	government-owned/contractor-operated
H[2]SO[4]	sulfuric acid
HI	hazard index
HQ	hazard quotient
IRP	Installation Restoration Program
m	meter
mg/L	milligrams per liter
mg/kg	milligrams per kilogram
MTV	mobility, toxicity, or volume
NC	nitrocellulose
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NNDPA	n-nitrosodiphenylamine
NPL	National Priorities List
O&M	operation and maintenance
OU	Operable Unit
OSHA	Occupational Safety and Health Act
ppm	parts per million
RA	risk assessment
RCRA	Resource Conservation and Recovery Act
RfD	reference dose
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
RMCS	retrievable monitored containment structure
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
TCLP	toxicity characteristic leaching procedure

tetryl	2,4,6-trinitrophenylmethylnitramine
246TNT	2,4,6-trinitrotoluene
TNT	trinitrotoluene
TSCA	Toxic Substance Control Act
USACE	U.S. Army Corps of Engineers
USC	United States Code
UCL95%	95 percent upper confidence level
g/g	micrograms per gram
USAEC	U.S. Army Environmental Center
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
Weston	Roy F. Weston, Inc.
WWII	World War II
yd[3]	cubic yard

DECLARATION OF THE INTERIM RECORD OF DECISION

SITE NAME AND LOCATION

Alabama Army Ammunition Plant
Area A Soil Operable Unit
P.O. Box 368
Childersburg, AL 35044-0368

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected interim remedial action for the soils of Study Areas 12 and D within the Area A Soil Operable Unit (OU) at Alabama Army Ammunition Plant (AAAP), Childersburg, AL, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for the site.

This interim remedial action is being taken to protect human health and the environment from unacceptable risks. This action is an interim final action for the soils of Study Areas 12 and D of the Area A soils operable unit.

The U.S. Environmental Protection Agency (EPA) and the State of Alabama concur with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Interim Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The Stockpile Soils Area OU, the first OU to address contaminated soils at AAAP Area A, involved treatment of contaminated soils that were excavated from Area A and stored in retrievable monitored containment structures (RMCSs) in Area B. The initial remedial actions that led to the soils stockpiling were performed based on findings of the remedial investigation/feasibility study (RI/FS) of AAAP completed in 1986. Cleanup activities at Area A included building decontamination and demolition and contaminated soil excavation and stockpiling. A ROD for treatment [i.e., incineration followed by solidification/stabilization (if required)] of the Stockpile Soils Area OU soils was signed on December 31, 1991. In 1990, EPA indicated that additional investigations needed to be conducted at Area A to ensure that no residual contamination remained on site; therefore, a supplemental remedial investigation (RI) was conducted in 1991. The Area A Soil OU is the second OU at AAAP Area A and it addresses the contaminated soils that were identified during the 1991 supplemental investigation.

The Area A Soil OU addresses the principal threats from lead and explosives contamination by excavating the newly identified contaminated soils from Study Areas 12 and D of Area A and storing the contaminated soils in RMCSs in Area B. Treatment of these contaminated soils will be consistent with that method specified in the Stockpile Soils Area OU [incineration followed by solidification/stabilization (if required) or stabilization only (if applicable)]. The scope of this Interim ROD is limited to the soils of Study Area 12 and D within Area A Soil OU. A supplemental Risk Assessment (RA) and Feasibility Study (FS), and a final ROD will be developed upon completion of the additional soils sampling at AAAP Area A. The soil sampling effort was initiated to screen soils not previously sampled for full scan analysis and to establish the background levels at Area A.

The major components of the selected remedy for the soils of Study Area 12 and D within the Area A Soil OU include:

- Excavation of approximately 3,800 cubic yards (yd[3]) of lead-contaminated soils from Study Area 12 and 5 yd[3] of explosives-contaminated soils from Study Area D of Area A,

- Transportation of contaminated soils to Area B and storage along with the Stockpile Soils Area OU soils in RMCSs,

- On-site treatment (in Area B) by incineration followed by solidification/ stabilization (if required) or stabilization only (if applicable) of contaminated soils along with the Stockpile Soils Area OU soils [the remediation of the Stockpile Soils Area OU soils was presented in the Stockpile Soils Area OU ROD], and

- On-site disposal of treated soil at a designated area in Area B.

STATUTORY DETERMINATIONS

This interim action is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate for this limited scope remedial action, and is cost-effective. Although this interim action is not intended to fully address the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action utilizes treatment and thus is in furtherance of that statutory mandate. Because this action does not constitute the final remedy for the operable unit, the statutory preference for remedies that employ treatment that reduces toxicity, mobility or volume as a principal element although partially addressed in this remedy, will be addressed by the final response action. Subsequent actions are planned to address fully the threats posed by the conditions at this operable unit. Because this remedy will not result in hazardous substances remaining on-site in Area A above health based levels, the five year review will not apply to this action.

Lewis D. Walker   Date
Deputy Assistant Secretary of the Army
(Environment, Safety, and Occupational Health)

INTERIM
RECORD OF DECISION

ALABAMA ARMY AMMUNITION PLANT
STUDY AREAS 12 AND D OF THE
AREA A SOIL OPERABLE UNIT

AUGUST 1994

Lieutenant Colonel B.L. Martin Date
Commander, Holston Army Ammunition Plant
Commander, Alabama Army Ammunition Plant

DECISION SUMMARY

1.0 SITE NAME, LOCATION, AND DESCRIPTION

Alabama Army Ammunition Plant (AAAP) is located in Talladega County in east-central Alabama, 30 miles east-southeast of Birmingham and 70 miles north of Montgomery, the State capital (Figure 1). The nearest town is Childersburg, AL, which is 4 miles south of AAAP. This interim remedial action is limited to contaminated soil in Study Areas 12 and D of AAAP Area A, hereinafter referred to as the Area A Soil OU. This action is an interim action for Study Areas 12 and D within Area A. A Risk Assessment (RA), a Feasibility Study (FS), and a final Record of Decision (ROD) for the Area A Soils Operable Unit (OU) will be developed upon completion of the soils sampling at AAAP Area A. The soil sampling effort was initiated to establish the background contaminant concentrations within Area A.

1.1 Physiography

AAAP is located within the Coosa Valley district of the Valley and Ridge physiographic province. The border between the Valley and Ridge province and the Piedmont province is south of AAAP between Talladega and Tallaseehatchee Creeks.

1.2 Climate

Talladega County's climate is temperate. The weather during fall, winter, and spring is controlled by frontal systems and contrasting air masses. Summer weather, which lasts from May or June until September or October, is almost subtropical because maritime tropical air prevails along the Bermuda high-pressure system.

Average daily temperatures in Talladega are 75 degrees Fahrenheit (F) for the high and 50 F for the low. Summer high temperatures are commonly 90 F or above; occasionally, maximum temperatures exceed 100 F. Temperatures below 32 F occur approximately 60 days per year, primarily in December and January.

Mean annual rainfall is 52 inches. The lowest average monthly rainfall (2.2 inches) occurs in October, and the highest average monthly rainfall (6.4) occurs in March. Talladega County has two rainy seasons per year. The winter rainy season is from December to April, with the majority of the rain associated with the passage of frontal systems. The summer rainy season is from May through September, with the highest rainfall occurring in June and July. Summer rains are normally convective thunderstorms.

1.3 Surface Hydrology

The majority of the surface runoff from AAAP drains either west or southwest into the Coosa River. A small portion of the southern and eastern side of AAAP drains toward Talladega Creek, a tributary of the Coosa River. Prior to the construction of AAAP, the area consisted of farms, woodlands, and wetlands. Much of the western half of AAAP was poorly drained. Small natural drainways were enlarged and rerouted to provide drainage from the various manufacturing operations.
<Figure>

FIGURE 1 LOCATION MAP OF AAAP

As shown in Figure 2, two natural drainage systems conveyed surface runoff from AAAP, west to the Coosa River. Liquid industrial wastes from the explosives manufacturing operations were conveyed west to the Coosa River by a man-made channel. No natural ponds existed on AAAP during its operation; however, two large storage lagoons were constructed to retain industrial wastes. Extensive wooded swamp and open pond areas have developed in the drainage systems at AAAP since the beginning of demolition activities in 1973, primarily as a result of damming of drainways by beavers.

Study Areas 12 and D of the Area A Soil OU are located in a clear, well-drained area near the northeast boundary of Area A.

1.4 Geologic Setting

The bedrock underlying AAAP has been mapped on a regional scale and has been identified as the undifferentiated Knox group of Upper Cambrian to Lower Ordovician age dolomite. The dolomite underlying AAAP is thick- to medium-bedded; cherty; and penetrated by numerous cavities, joints, and fractures. The dolomite is overlain by residual soil derived from weathering processes. This soil matrix consists primarily of clay, with some silt, sand, and occasional chert boulders, and varies in thickness from less than 3 feet to more than 80 feet.

1.5 Land Use

AAAP is currently in an inactive caretaker status with controlled access. The only activity occurring on AAAP is occasional Army-supervised logging. The land surrounding AAAP is a mixture of recreational and industrial. AAAP is bordered on the west side by a country club; on the south by a paper products company; on the east by wooded, private property; and on the north by a water treatment plant. Future land use of the AAAP property is expected to consist of wildlife habitat, hunting grounds, and occasional logging of wooded areas. Area A, which includes Study Areas 12 and D of the Area A Soil OU, was auctioned and conveyed to private buyers in 1990 and is currently used for hunting grounds and occasional logging.

1.6 Soils

The soils at AAAP (Areas A and B) are generally divided into three associations. Soils of the Bodine-Minvale Association are found on the high ground of the eastern portion of AAAP. This association is composed of deep, well-drained, steep, cherty, medium-textured soils derived from limestone and dolomite. Most of AAAP is covered by soils of the Decatur-Dewey-Fullerton Association, which are also deep, well-drained, loam soils derived from limestone and dolomite. The soils of the floodplains of Talladega Creek and the Coosa River have been classified as the Chewacla-Chenneby-McQueen Association. These are deep, nearly level, alluvial loam soils that grade from somewhat poorly drained to well-drained and are subject to flooding.

These broad-based associations represent agricultural classifications rather than engineering descriptions. Soil constitution at AAAP, and thus the Area A Soil OU, within the three associations may range from soils consisting primarily of sand and silt with little clay to soils comprised almost entirely of clay.

<Figure>

FIGURE 2 INSTALLATION DIVISIONS AT AAAP

1.7 Groundwater

Potable groundwater from the dolomite aquifer of the Coosa Valley supplies the needs of the communities, homes, farms, and industries around AAAP. The majority of the successful wells draw water from the solution cracks and cavities in the dolomite. A few wells are completed in the residual soil, but these wells are less productive than those drilled into the dolomite.

1.8 Ecological System

The environment at AAAP has been disturbed 3 times in the past 40 years. Prior to construction of the facility, the area consisted primarily of cropland and woodland. The first major change occurred during the operational years when much of AAAP consisted of maintained industrial areas. In the second major change, the Army instituted a woodland management plan, following closure operations, that extensively modified AAAP by allowing 3,411 acres of controlled pine forest to be planted. The third major change occurred as a result of demolition of various areas following closure operations.

Currently, many of the formerly maintained drainages, pine plantations, and cleared areas have undergone considerable vegetative overgrowth. Much of the planted pine has been harvested, and reforestation has occurred through natural revegetation. Damming of surface drainages by beavers has modified the drainage systems; drainage has become much slower, and extensive wooded swamp and shallow pond areas have developed. As a result of these changes, the major ecological systems currently consist of the following types: grassland/old field associations, upland pine forest/pine plantations, oak forests, low moist pine woods, hardwood swamps, intermittent streams, shallow ponds, and drainage ditches.

These systems support abundant populations of aquatic and terrestrial organisms. White-tailed deer, introduced in the 1960s, have become particularly abundant, as have certain predators (the red-tailed hawk, the marsh hawk, and the bobcat).

The extensive development of shallow beaver ponds has resulted in large populations of amphibians and aquatic reptiles, and the East Beaver Pond provides roosting for waterfowl.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

AAAP was established on 13,233 acres of land near the junction of Talladega Creek and the Coosa River. The plant was built in 1941 and operated during World War II (WWII) as a government-owned/contractor-operated (GOCO) facility. AAAP produced nitrocellulose (NC), single-based smokeless powder, and nitroaromatic explosives [i.e., trinitrotoluene (TNT), dinitrotoluene (DNT); and 2,4,6-trinitrophenylmethylnitramine (tetryl)]. Activities at AAAP included the manufacture of explosives; DNT; and the chemicals sulfuric acid (H2SO4), aniline, N,N-dimethylaniline, and diphenylamine. Spent acids were recycled and wastes resulting from these operations were disposed of. In August 1945, operations were terminated at AAAP, and the plant was converted to standby status.

The plant was maintained in various stages of standby status until the early 1970s. In 1973, the Army declared AAAP excess to its needs. Since that time, several parcels of the original property, including Area A, were sold or returned to their previous owners. In 1977, a 1,354-acre parcel was sold to Kimberly Clark, Inc. for construction of a paper products plant. Area A, encompassing 2,714 acres, was auctioned in May 1990. Future land uses for these properties is expected to consist of wildlife habitat, hunting grounds, and occasional logging of wooded areas.

In 1978, the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), managing the Army's Installation Restoration Program (IRP), conducted a record search that concluded that specific areas of the facility were potentially contaminated by explosives and lead compounds. Further studies at AAAP confirmed soils contamination with explosives compounds, asbestos, and lead. Several investigations were conducted between 1981 and 1983 to define contamination further. In 1984, AAAP was proposed for inclusion on the CERCLA (Superfund) National Priorities List (NPL).

An RI/FS under the Department of Defense (DOD) IRP was initiated in 1985 to determine the nature and extent of contamination at AAAP and the alternatives available to clean up the site. For the purposes of the RI/FS, the facility was divided into two general areas. Area A consisted of the eastern portion of the facility, and Area B consisted of the western portion (Figure 2). The initial RI under the IRP confirmed the existence of explosives, asbestos, and lead contamination in the soil in Area A, and in the soil, sediment, and groundwater in Area B. The RI for Areas A and B was completed in 1986. As a result of the findings of the RI, cleanup activities at Area A were conducted in 1986 and 1987, which included building decontamination and demolition, soil excavation, and stockpiling. Initially, 36,400 yd[3] of contaminated soils were excavated from Area A and stockpiled in Area B in two covered buildings and on a concrete slab that was subsequently covered with a membrane liner. In July 1987, AAAP was placed on the NPL.

Area A includes the Magazine Area (Study Area 11), Old Burning Ground (Study Area 12), Small Arms Ballistic Range (Study Area 13), Cannon Range (Study Area 14), Old Well (Study Area 15), the eastern portion of the Propellant Shipping Area (Study Area 17), and a parcel of woodland outside the security fenceline. Additional areas identified during subsequent investigations conducted at the site following preparation of the original feasibility study (FS) report include the Rubble Pile (Study Area C), the New Trench Area (Study Area D), the Disposal Area (Study Area E), the Number 2 Rubble Pile (Study Area F), the Henningsburg Area (Study Area G), and the 229 Area (Study Area H). An overall layout of Area A showing the locations of all study areas is presented in Figure 3. The study areas within Area A and their descriptions are presented in Table 1.

In 1990, EPA indicated that additional investigations needed to be conducted at Area A to ensure that no residual contamination remained. Area A was conveyed to private buyers in August 1990, with the provision that additional investigations would be performed.

In 1991, a supplemental RI was conducted to verify the effectiveness of the completed remedial actions in Area A. The supplemental RI determined that soils at two study areas within Area A (Study Areas 12 and D) continue to contain lead and explosives at unacceptable concentrations. The supplemental RI/FS concluded that approximately 3,800 yd[3] of lead-contaminated soil from Study Area 12 and approximately 5 yd[3] of explosives-contaminated soil from Study Area D required further remediation as a part of this interim action.

<Figure>

FIGURE 3 STUDY AREAS WITHIN AREA A AT AAAP

Table 1. AAAP AREA A STUDY AREAS

Study Area	Description
11	Magazine Area
12	Old Burning Ground
13	Small Arms Ballistics Range
14	Cannon Range
15	Old Well
17	Propellant Shipping Area (Eastern Portion)
C	Rubble Pile
D	New Trench Area
E	Disposal Area
F	Number 2 Rubble Pile
G	Henningburg Area
H	229 Area

Source: ESE, Inc.

Subsequent evaluation of the background levels for chromium and arsenic at the site indicate that the levels of these metals observed at the various study areas (including Areas 12 and D) may present a health risk. These metals concentrations are observed across the entire site at these elevated concentrations. As these metals were not a part of the manufacturing process of explosives, their existence a the site requires additional interpretation. This interpretation and the presentation of any identified health risk will be presented in the final ROD being prepared for the site. This continued data analysis should not interfere with the removal action being planned which deals only with the explosives and lead contamination.

The following documents outline the results of the initial assessment of AAAP, cleanup actions conducted in Area A, and the investigations of the Area A Soil OU including Study Areas 12 and D. More detailed information is available in documents for public review at the following locations: the Library Service, Alabama Public Information, Montgomery, AL; the B.B. Comer Memorial Library and Information Center, Sylacauga, AL; and the Earle A. Rainwater Memorial Library, Childersburg, AL.

1. Installation Assessment of Alabama Army Ammunition Plant, Report 130, May 1978.

2. Alabama Army Ammunition Plant, Area A Remedial Actions, Final Report, February 1988.

3. Stockpile Characterization Report for Alabama Army Ammunition Plant, Childersburg, Alabama, July 1991.

4. Feasibility Study for the Alabama Army Ammunition Plant Stockpile Area, October 1991.

5. Proposed Plan for Early Remedial Action of Stockpile Soils at Alabama Army Ammunition Plant Stockpile Soils Area Operable Unit, November 1991.

6. Record of Decision for Early Remedial Action of Stockpile Soils at Alabama Army Ammunition Plant Stockpile Soils Area Operable Unit, December 1991.

7. Supplemental Remedial Investigation/Feasibility Study for Area A, Alabama Army Ammunition Plant, Final Baseline Risk Assessment, 1992.

8. Supplemental Remedial Investigation/Feasibility Study for Area A, Alabama Army Ammunition Plant, Final Feasibility Study, December 1992.

9. Supplemental Remedial Investigation/Feasibility Study for Area A Soil Operable Unit, Alabama Army Ammunition Plant, Proposed Plan for Early Remedial Action of Contaminated Soils, January 1993.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

In accordance with the Army's Community Relations Plan (CRP) for AAAP, October 1990, the FS and the Proposed Plan for this ROD were released to the public on March 31, 1993. The public comment period started on April 1, 1993, and ended on April 30, 1993. Documents were made available to the public at the following locations: the Library Service, Alabama Public Information, Montgomery, AL; the B.B. Comer Memorial Library and Information Center, Sylacuaga, AL; and the Earle A. Rainwater Memorial Library, Childersburg, AL. The notice of availability of the Proposed Plan was published in Daily Home, Birmingham News, Anniston Star, and Montgomery Advertiser on March 30, 1993.

In accordance with the CRP, a public meeting was held at Central Alabama Community College on April 20, 1993 to inform the public of the preferred alternative and to seek public comments.

At this meeting, representatives from AAAP, EPA, the Alabama Department of Environmental Management (ADEM), the U.S. Army Corps of Engineers (USACE), and Army Environmental Center (AEC) were present and answered questions about the site and the remedial alternatives under consideration. A response summary to the public comments received during the public comment period and hearing is included in the Responsiveness Summary section of this report.

The Proposed Plan identified Alternative 1D as the preferred remedy. Alternative 1D, which is described in the FS, consists of excavation of Area A contaminated soils, transportation to Area B, storage with stockpiled soils, on-site treatment (in Area B) along with the stockpiled soils, and on-site disposal of treated soils at a designated area in Area B. This action is an interim action for soils of Study Areas 12 and D within Area A.

AAAP, EPA, ADEM, USACE, and the AEC reviewed all written and verbal comments submitted during the public comment period. Review of these comments caused no significant changes to the preferred remedy outlined in the Proposed Plan. Subsequent discussion between AAAP, EPA, ADEM, USACE, and AEC led to a decision to limit the scope of actions to Study Areas 12 and D only. Additional investigations will determine if additional actions are required in any other areas of the Area A soils operable unit.

4.0 SCOPE AND ROLE OF STUDY AREAS 12 AND D WITHIN THE AREA A SOIL OU

OUs are defined as discrete actions that comprise incremental steps toward the final overall remedy. These actions may completely address a geographic portion of a site or a specific problem. OUs may also be early actions; however, they must be followed by subsequent actions to address the scope of the problem definitely.

The Stockpile Soils Area OU, the first OU to address contaminated soils at AAAP Area A, involved treatment of contaminated soils that were excavated from Area A and stored in RMCSs in Area B. The initial remedial actions that led to the soils stockpiling were performed based on findings of the RI/FS of AAAP completed in 1986. Cleanup activities at Area A included building decontamination and demolition and contaminated soil excavation and stockpiling. A ROD for treatment [i.e., incineration followed by solidification/stabilization (if required)] of the Stockpile Soils Area OU soils was signed on December 31, 1991. In 1990, EPA indicated that additional investigations needed to be conducted at Area A to ensure that no residual contamination remained on site; therefore, a supplemental RI was conducted in 1991. During this investigation it was decided to split Area A into separate operable units; the Area A Soils Operable Unit and the Area A Groundwater Operable Unit to facilitate cleanup of the soils while the groundwater investigation continued. This interim action covers soils of Study Areas 12 and D within the Area A Soil OU at AAAP and addresses the contaminated soils that were identified during the supplemental investigation. Additionally, a separate OU is planned to address groundwater and soil at Area B.

Currently, the contaminated soils of the Stockpile Soils Area OU within Area B are awaiting remediation. On-site incineration was the selected remedy in the ROD for the Stockpile Soils Area OU. The ash from the incinerator will be tested for lead contamination and treated by solidification/stabilization (if required) prior to final disposal.

This action is an interim action and is intended to address only the contaminated soils of Study Areas 12 and D within the Area A Soil OU. The threats addressed in this interim remedial action are the contaminated soils located at Study Areas 12 and D. Actual or threatened release of hazardous substances from these contaminated soils, if not addressed by implementing the selected early action, may present a current or potential threat to public health, welfare, and the environment. The Army will propose remedies in a final ROD for the remaining portions of AAAP following the completion of other RI/FS efforts currently in progress.

5.0 SUMMARY OF SITE CHARACTERISTICS

Areas identified during supplemental investigations conducted at the site following preparation of the original feasibility study (FS) report include the Rubble Pile (Study Area C), the New Trench Area (Study Area D), the Disposal Area (Study Area E), the Number 2 Rubble Pile (Study Area F), the Henningsburg Area (Study Area G), and the 229 Area (Study Area H). Study Area C was initially presumed to be contaminated; however, because site-related contamination was not detected at this area, it was not evaluated further.

Significant findings associated with each area investigated during the supplemental RI are presented in the following paragraphs. A summary of chemicals of potential concern (COPCs) detected at each area is presented in Table 2. Based on these findings, a supplemental RA was prepared to assess the impact(s) of the contaminants at each site on human environmental concerns and to determine appropriate remediation levels. In May of 1994, background soil samples were collected as part of the ongoing supplemental RI. Table 2 presents a summary of the average detected background concentrations of inorganics compared to the average detected concentrations detected at Areas 12 and D.

A summary of the toxicity and carcinogenicity of the contaminants at Area A is presented in Table 3. The following discussion summarizes the site characteristics for each study area and includes a description of the fate and transport of site contaminants.

<Figure>
<Figure>
<Figure>
<Figure>

5.1 Magazine Area (Study Area 11)

The Magazine Area, located in the north central portion of Area A and consisting of a series of storage buildings, is the largest study area in AAAP Area A. The Series 260 Buildings are designated for storing DNT, the Series 1010 Buildings for storing tetryl, and the Series 811 Buildings for storing TNT.

Soils were sampled at two different times as part of the RI effort and analyzed for munition and inorganic chemicals. One of the 40 samples collected during post-cleanup as part of the second sampling effort and tested for munitions indicated the presence of 1,3-dinitrobenzene (13DNB) at 0.53 milligrams per kilogram (mg/kg) concentration.

Only organic chemicals were detected at this study area. The primary migration pathways of munitions detected in soil are fugitive dust or particulate emission. In addition, due to the proximity of a hardwood swamp near Study Area 11, the potential exists for chemicals in soil to migrate to the swamp via surface runoff during periods of heavy rainfall. These compounds may subsequently undergo photolytic and biological degradation in the swamp. The amount of munitions reaching groundwater from this area is expected to be low as discussed in Sec. 3.3.2 of the RA because of the low concentrations detected in the soils. Parts of this area are being logged and cleared for hunting; this exposure pathway was addressed as a current exposure pathway in the RA.

5.2 Old Burning Ground (Study Area 12) - Addressed by this Interim Action

This study area is located in the northern section of Area A and was the primary disposal site for unacceptable batches of explosives, propellants, and other reactive wastes. Periodic burning of the study area's vegetation was practiced during plant operation to minimize the danger of wildfires. This study area also included a former Lead Remelt Facility. Surface water flow in this area is intermittent and occurs only during heavy rain events.

Most of the inorganics were uniformly distributed across the sites; however, several inorganics were detected at levels above site background. As shown in Table 2, arsenic, chromium, and lead were detected at levels above the maximum and average detected concentrations observed in site background samples. In addition, 246TNT was detected in 1 of 58 samples collected at Study Area 12.

Organic and metallic chemicals were detected at this study area. The primary migration pathways of munitions and metals detected in soil are fugitive dust or particulate emission. In addition, the potential exists for chemicals in soil to migrate via surface runoff during periods of heavy rainfall. The amount of munitions reaching groundwater from this area is expected to be low because of the low concentrations detected in the soils.

5.3 Small Arms Ballistics Range (Study Area 13)

This study area is approximately 3.7 acres, located centrally at the northern boundary of Area A. This area was covered by gravel during the operational period and was used as a training range for small arms ballistics. A ballistics laboratory was adjacent to this area during the operational period. Currently, no buildings exist on this site.

The results of the soil and sediment sampling indicated the presence of bis (2-ethylhexyl) phthalate (B2EHP), iron, lead, and n-nitrosodiphenylamine (NNDPA). Organic and metallic chemicals were detected at this study area. The primary migration pathways of NNDPA, B2EHP, and metals detected in soil are fugitive dust or particulate emission. In addition, the potential exists for chemicals in soil to migrate via surface runoff during periods of heavy rainfall. The amount of NNDPA and B2EHP reaching groundwater from this area is expected to be low because of the low concentrations detected in the soils.

5.4 Cannon Range (Study Area 14)

This study area, used for cannon test firing, is approximately 13 acres located at the northeast corner of the northern boundary of Area A. Access to this area is restricted by a fence and locked gate. Since operations ceased at AAAP all buildings have been removed and the remaining area has not been maintained.

Only lead was detected at this study area, and the lead levels appear to be similar to the concentrations across Area A. The primary release mechanism for lead at this site would be via release to the atmosphere as particulate or dust emissions. However, due to the degree of vegetative cover and relatively few areas of bare soils, this migration pathway is not considered significant.

5.5 Old Well (Study Area 15)

The Old Well was a relict hand-dug well, located in the northeast portion of Area A, which served a farm or residence prior to construction of AAAP and was reported to be approximately 30 ft deep and 5 ft in diameter. During the razing of the laboratory building which supported the explosives manufacturing operations, laboratory reagents, non-sparking paints, 55-gallon (gal) drums of a tar-like material, fire retardant paint, containers of other unidentifiable materials, and old tires were reportedly disposed of in this well.

Soil samples contained only lead at a maximum concentration of 12.8 ppm. Surface water samples contained bis(2-ethylhexyl)-o-phthalate and methylene chloride.

Organic and metallic chemicals were detected at this study area. The primary migration pathways of the organics and metals detected in soil are fugitive dust or particulate emission. In addition, the potential exists for chemicals in soil to migrate via surface runoff during periods of heavy rainfall. The well and surrounding soils were removed during a remedial action in 1986.

5.6 Propellant Shipping Area (Study Area 17)

The propellant shipping houses are located in the south-central portion of AAAP. The shipping house area (Series 229 Buildings) used to store propellant prior to shipment and consisted of 48 buildings, 13 of which are located on the land previously sold to Kimberly Clark. The remaining 35 buildings, located within the current AAAP boundary, comprise Study Area 17. Although Study Area 17 overlaps into Area B, its contamination status was included in the Area A RI/FS process.

Soil samples from this study area were collected during initial RI efforts as well as after the cleanup was complete. No organic contaminants were detected in the first sampling effort. The second sampling effort (supplemental RI) determined the lead levels in the site-related soils following the burning of lead (bullets) containing timbers. All of the soil samples collected as part of the supplemental RI contained detectable levels of lead. The average lead concentration in the soils was approximately 20 ppm and ranged from 8.83 to 130 ppm. Only four of the samples exhibited a lead concentration greater than 30 ppm.

Only lead was detected at this study area. The levels of lead appear to be similar to the concentrations across Area A, indicating that lead is not associated with a source. The primary release mechanism for lead at this site would be via release to the atmosphere as particulate or dust emissions. However, due to the degree of vegetative cover and relatively few areas of bare soils, this migration pathway is not considered significant. The shipping houses were removed during a remedial action completed in 1986.

5.7 New Trench Area (Study Area D) - Addressed by this Interim Action

During remedial activities conducted by Roy F. Weston, Inc. (Weston) in 1988, Study Area D was identified. This area is approximately 2.9 acres located north of Study Area 11. Area D was used for disposing of equipment and other general wastes.

Nitroaromatic compounds were detected in 3 of the 34 soil samples collected during the Supplemental investigation. All three samples, which were collected from the 0- to 3-ft depth, contained 246-TNT, with one sample containing a high concentration (13,900 ppm) of this compound. Although the concentration of 246-TNT in the second sample was an order of magnitude lower (1,400 ppm), the results suggest the presence of an area of high nitroaromatic contamination. Of the three samples that contained 246-TNT, two also contained 135-TNB. The presence of these contaminants is due to past disposal practices in the area.

Munitions and metallic chemicals were detected at this study area. The primary migration pathways of the organics and metals detected in soil are fugitive dust or particulate emission. In addition, the potential exists for chemicals in soil to migrate via surface runoff during periods of heavy rainfall. The important fate and transport processes of the metals in the terrestrial environment are adsorption/desorption, precipitation/dissolution, and speciation. The rate and extent of these processes are influenced by pH, ionic strength, inorganic and organic ligands, and redox conditions. The metals are expected to be in the adsorbed phase or in solution form and be transported via surface runoff or leaching.

5.8 Disposal Area (Study Area E)

During remedial activities conducted by Weston in 1988, Study Area E was identified. This area is less than 1 acre and is located north of Study Area 11 and east of Study Areas D and 12. Study Area E was used for disposing of equipment and other general wastes.

No nitroaromatic contamination was detected in any of the soil samples collected as part of the supplemental investigation. Lead and arsenic were detected in all 32 samples, and chromium was also detected in 19 of the samples.

Only metals were detected at this study area. The important fate and transport processes of the metals in the terrestrial environment are adsorption/desorption, precipitation/dissolution, and speciation. The rate and extent of these processes are influenced by pH, ionic strength, inorganic and organic ligands, and redox conditions. The metals are expected to be in the adsorbed phase or in solution form and be transported via surface runoff or leaching.

5.9 Number 2 Rubble Pile (Study Area F) and Henningsburg Area (Area G)

During remedial activities conducted by Weston in 1988, Study Areas F and G were identified. These tracts were suspected to have been localized areas used for the disposal of equipment and other general wastes. Study Area F is located near the Area A northwest boundary, and Study Area G is located centrally near the Area A east boundary. The Weston investigation indicated that the analytical results for these two areas were below detection limits.

5.10 229 Area (Study Area H)

During remedial activities conducted by Weston in 1988, Study Area H was identified. This area was used for disposing of equipment and other general wastes and is located directly south of Study Area 17.

Only lead was detected at this study area. The levels of lead appear to be similar to the concentrations across Area A, indicating that lead is not associated with a source. The primary release mechanism for lead at this site would be via the atmosphere as particulate or dust emissions. However, due to the degree of vegetative cover and relatively few areas of bare soils, this migration pathway is not considered significant.

6.0 SUMMARY OF SITE RISKS

6.1 Introduction

In 1991, a supplemental RI was conducted at the request of EPA Region IV to verify the effectiveness of the completed remedial actions in Area A. The supplemental RI and baseline RA determined that soils at two study areas within Area A (Study Areas 12 and D) continue to contain lead and explosives at unacceptable concentrations and, therefore, require further remediation.

Risks due to site contamination were estimated for both the historical and post remediation data and reported as pre- and post-remediation risks. Feasibility efforts were focused on the remaining site contamination that was not addressed by the earlier remediation efforts. Identified areas with excessive contamination were Study Areas 12 and D. The methods implemented to estimate the risks are in accordance with the risk assessment guidance for CERCLA sites (EPA, 1989) and are presented in the following sections.

6.2 COPCs

COPCs at the Superfund site are hazardous chemicals found to be present on site due to past site-related activities. The COPCs identified during the supplemental RI efforts at the Area A of the AAAP are:

Organic Chemicals	Inorganic Chemicals
1,3-dinitrobenzene (13DNB)	Arsenic
1,3,5-trinitrobenzene (135TNB)	Chromium
2,4,6-trinitrotoluene (246TNT)	Copper
2,4-dinitrotoluene (24DNT)	Lead
2,6-dinitrotoluene (26DNT)	Mercury
Nitrobenzene (NB)	Nickel
	Selenium
	Silver
	Zinc

Table 4 includes the statistical estimates of the exposure concentrations used for human and ecological risk estimates.

6.3 Exposure Assessment

The human baseline RA evaluated three primary exposure scenarios for quantitative assessment of the risks associated with potential exposure to site-related COPCs. While the current caretaker scenario was not considered a significant exposure pathway, as the caretaker does not come into contact with the study areas on a routine basis as would a future worker, to be most conservative (to protect human health) it was assumed that a caretaker would have the same, and most likely less exposure as a future worker. Thus, the future worker scenario also represents the current caretaker scenario. The human exposure analysis evaluates the following three exposure scenarios.

1. Future Residential

- Exposure of residential adults and children to contaminated soil may occur via direct contact, incidental ingestion and inhalation of fugitive dust.

- The ROD is based on this exposure scenario because it provides the most conservative potential exposure evaluation.

2. Property and/or wildlife maintenance worker

- Exposure of maintenance workers to contaminated soil may occur via direct contact, incidental ingestion, and inhalation of fugitive dust.

- The potential may exist for the current caretaker to contact contaminated soils. However, since the future worker scenario, which is a more conservative exposure evaluation assuming standard default worker exposure (250 days/year for 25 years), did not result in any unacceptable risks or HIs, a quantitative evaluation of the current caretaker exposure was not necessary.

<Figure>

3. Hunters

- Exposure of hunters to contaminated soil may occur via direct contact, incidental ingestion, and inhalation of fugitive dust. In addition, indirect exposure to site chemicals may occur through consumption of contaminated game.

- This scenario was evaluated in the pre-cleanup RA. Since hunter exposure to relatively higher levels of pre-cleanup chemical concentrations did not result in any unacceptable risks or HIs and the current contaminant levels are lower than those during the pre-remediated site conditions, this scenario was not evaluated in the post-remediation RA.

Although occasional logging type activities may contribute to the worker exposure, the exposure is random and insignificant compared to the property maintenance worker exposure. Therefore, this scenario is not quantitated here; it is, however, discussed in detail in the RA.

Due to the nonvolatile nature of the site chemicals, inhalation of airborne vapors is not evaluated. Table 5 presents the exposure pathways analyzed and the rationale for their selection at the site.

For the residential and worker exposure evaluation, EPA-recommended standard default values were used for the majority of exposure factors. Site-specific information was used to develop exposure parameters for the hunter scenario and some of the worker and residential exposure factors. The exposure parameters used to estimate residential, worker, and hunter exposure are listed in Table 6. The complete exposure factor development is included in the baseline RA (ESE, 1992a).

The important ecological exposure routes are those pathways associated with soils or prey, including the following:

1. Ingestion of contaminants retained on skin, fur, or feathers via preening, burrowing, feeding, and other activities;

2. Ingestion of contaminated prey organisms;

3. Dermal contact; and,

4. Inhalation of windborne dusts.

Potential ecological exposure pathways are included in Table 7. Exposure concentrations used for human and ecological intake estimates are included in Table 2.

Table 5. SUMMARY OF THE EXPOSURE PATHWAYS ANALYZED FOR THE QUANTITATIVE RA

Potentially Exposed Population	Exposure Rate, Medium and Exposure Point	Pathway Selected for Evaluation	Reason for Selection on Exclusion
Future Land Use			
Residential	Direct dermal, inhalation and ingestion of COCs in soil and sediment	Yes	Area could be developed into future residential area
Onsite Worker	Direct contact with COCs in soil and sediments by ingestion, inhalation, and dermal contact	Yes	If the area is used for hunting purposes, the wildlife maintenance worker would be onsite regularly
Hunter	Contact with COCs in soil and sediment by incidental ingestion, dermal contact and dust inhalation	Yes	Hunters may come in contact with soils during the sporting activities
Hunter	Ingestion of COCs in the game meat	Yes	Hunters could be exposed to the chemicals present in the meat of game animals

Source: ESE, Inc.

<Figure>

6.4 Toxicity Assessment

The carcinogenic slope factors (CSFs) and the reference doses (RfDs) for the COPCs at AAAP Area A are included in Table 3. These values, in association with the exposure scenarios described in Sec. 6.3, were used to quantify the risks and HIs.

CSFs have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals of concern. CSFs, which are expressed in units of (mg/kg-day)[-1], are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upperbound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upperbound" reflects the conservative estimate of the risks calculated from the CSF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. CSFs are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

EPA has developed RfDs for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

6.5 Risk Characterization

The risk characterization step of the RA estimates the carcinogenic and noncarcinogenic hazards from chemicals by combining the information from the exposure estimates and the toxicity information for each chemical. Excess lifetime cancer risks are determined by multiplying the intake level with the CSF (Table 3). These risks are probabilities that are generally expressed in scientific notation (e.g., 1 x 10[-4] or 1E-04). A cancer risk of 1 x 10[-4] means that one additional person out of 10,000 is at risk of developing cancer as a result of site-related exposure to a carcinogen over a lifetime under the specific exposure conditions at a site, if site is not cleaned up.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) for human exposure or environmental quotient (EQ) for environmental exposure (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's RfD). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the HI can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

Table 7. POTENTIAL ECOLOGICAL EXPOSURE PATHWAYS FOR ALL STUDY AREAS IN AREA A

Medium and Exposure Pathway	Study Area 11	12	13	14	15	17	D	E	H
Surface Water									
Dermal			X		X				
Ingestion			X		X				
Sediments									
Dermal			X						
Ingestion			X						
Soils									
Dermal	X	X	X	X	X	X	X	X	X
Ingestion	X	X	X	X	X	X	X	X	X
Inhalation	X	X	X	X	X	X	X	X	X
Food Web Predation									
Terrestrial	X	X	X	X	X	X	X	X	X

Source: ESE, Inc.

The risk/HI or EQ is calculated for each exposure pathway at each study area. Any study area exceeding these levels was further considered for remedial action in the FS. A resultant risk greater than 1 in 10,000 or an HI or EQ greater than 1 is interpreted to mean that an adverse impact to human health and the environment may occur. A summary of the human health risks exceeding these values is included in Table 8. A summary of the ecological health risks is in Table 9.

For Study Area 12 in the Area A Soil OU, carcinogenic COPCs present a risk of 1.3 in 10,000, which is above the upperbound acceptable risk level of 1 in 10,000. Most of the risk is from arsenic under residential exposure conditions. The total HI for a child resident is 6.4, primarily from arsenic and chromium.

EQs at Study Area 12 exceeded 1 for lead and chromium. The soils contain lead at a maximum concentration of 10,400 ppm. Only the risk from lead may suggest an adverse impact to the environment. EQs for 246TNT also are greater than 1.0, but the data distribution and the lack of significant evidence of exposure suggests that adverse impacts would not be anticipated.

Therefore, lead, but not 246TNT, may pose an unacceptable hazard to nonhuman receptors at Study Area 12. Lead should be remediated to EPA's health-based guidance level of 500 mg/kg; this level was recommended in August 1991 by EPA's Office of Solid Waste and Emergency Response which is an update of the Technical Directive #9355.4-02 entitled "Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites" (September 1989).

For Study Area D in the Area A Soil OU, the cumulative excess cancer risk to adults was below the upperbound acceptable risk level of 1 in 10,000. The organic contaminant 246-TNT contributes to overall risk. The noncarcinogenic HI for a future child resident at Study Area D is 6, primarily due to the presence of 246TNT, arsenic, and chromium. The HI for a future child resident is 5 due to the presence of arsenic and chromium. EQs for 246TNT exceed 1, and adverse effects to the environment could potentially occur. However, a study of 246TNT and its metabolites concludes that exposure from human consumption of deer, quail, and rabbit is minimal because contaminants were not present above analytical detection limits. The cleanup values calculated for 246TNT and lead are presented in the summary section (Sec 6.7).

6.6 Uncertainty Analysis

Uncertainty is inherent in the risk estimation process due to the assumptions required to estimate the risks. The following are some of the uncertainties observed in the RA at Area A:

1. Available soil sampling information is limited.

2. Background sampling information for the inorganic chemicals is not available.

3. The assumptions EPA used to develop the toxicity factors (e.g., CSFs) are subject to high uncertainty due to the assumptions used.

4. The toxicity factors for chromium do not represent environmental exposure conditions, and the conservative assumptions used for risk estimates consider that all chromium is in the more toxic hexavalent form.

5. Ecotoxicity data are not available for nonhuman receptors. Therefore, laboratory data were extrapolated to represent the ecological receptors contributing to a large uncertainty.

Table 8. SUMMARY OF POTENTIAL RISKS AND HIS EXCEEDING TARGET VALUES FOR SOIL EXPOSURE AT AAAP AREA A -- POST-CLEANUP

Contamination Area	Analyte	Lifetime Resident Risk	Child Resident HI
12	246TNT	4E-08	3E-03
	AS	1E-04	5
	CR	8E-06	2
	PB	[*]	
	TOTAL	1E-04	7
D	CR	6E-06	4
	AS	9E-05	1
	246TNT	2E-06	1
	135TNB	NA	0.1
	CU	NA	0.1
	PB	[*]	
	TOTAL	1E-04	6

Note: * Lead was detected at levels above EPA's guidance health-based level of 500 mg/kg.

Source: ESE, Inc.

<Figure>

Perhaps the most uncertainty in the risk evaluations stems from the exposure assumptions. While the current exposure pathway is considered insignificant compared to the future exposure pathways, the current exposure pathway was assumed to be equivalent to the future worker exposure. In addition, intake assumptions, chemical-specific absorption coefficients, individual variation in the intake, absorption, and the expression of the toxicity contribute significantly to the uncertainty in the risk estimates. Therefore, actual exposure to human and ecological receptors is unknown. The most significant uncertainty at Area A is related to the risk estimates and the underlying assumptions regarding exposure to chromium. Arsenic and chromium in Study Areas 12, D, and E are widely distributed. Arsenic was detected in 100 percent of the samples tested. Arsenic was detected in 36/36 samples at Study Area 12, 34/34 samples at Study Area D, and 36/36 samples at Study Area E. Chromium is present in greater than 70 percent of the samples. Chromium was detected at Study Area 12 in 31/36 (86 percent) samples, at Study Area D in 26/34 (76 percent) samples, and at Study Area E in 25/36 (70 percent) samples (App. I of RA report, ESE, 1992a). Details of the uncertainty associated with exposure to chromium can be found in the baseline RA report (ESE, 1992a).

6.7 Summary

The soils of concern in the Area A Soil OU are located in Study Areas 12 and D. These soils contain elevated levels of inorganics (i.e., arsenic, chromium, and lead) and explosives. The chemical-specific remediation level (RL) for arsenic is background, while for chromium and 246TNT, the RL was developed based on standard default exposure assumptions. The RL for lead was adopted from available EPA region-wide guidance, which indicates that lead in soil at Superfund sites be remediated to 500 to 1,000 mg/kg for residential sites. Table 10 lists the final COCs present at Study Areas 12 and D. The summary of the results is as follows:

Study Area 12--Lead was detected in four samples at Study Area 12; the concentrations varied between 232 and 10,400 ppm. A toxicity criterion was not available for lead to obtain a risk or an HI value. However, based on the EPA guidance, a health-based remediation level of 500 ppm in soil is recommended for residential land use of Superfund sites. As Area A has been sold to private ownership, the future unlimited use may include residential use of the land.

Arsenic exceeds background concentrations and the purely health-based cleanup level (0.37 mg/kg for a lifetime exposure) is below background (11.7 mg/kg, maximum concentration of AS in background). This is a sitewide occurrence which will be addressed in the final ROD for Area A. The exceedance of the HI for chromium is due to assumption that chromium is in the most toxic hexavalent form and that inhalation to dust is considered a significant pathway. Using standard default exposure assumptions for a residential child, taking into account that ingestion of soils is the primary exposure route to a child, a health-based RL of 390 mg/kg has been calculated. Because the maximum on-site concentrations as well as the exposure concentrations of chromium are well below this concentration, and the site is vegetated and thus, not amendable to producing dust 350 days per year, the current site concentrations do not suggest that chromium requires remediation. The estimated volume of lead-contaminated soil is approximately 3,800 yd[3].

Table 10. SUMMARY OF CHEMICAL PARAMETERS DETECTED IN AREA A SOILS AT CONCENTRATIONS EXCEEDING CLEANUP CRITERIA

Study Area	Sample Number	Depth (ft)	Chemical	Chemical Concentration (mg/kg)	Chemical-Specific Remediation Level (mg/kg)
12	12-11	0.5	Lead	1,320	200
	12-9	0.5	Lead	10,400	200
	12-16	0.5	Lead	232	200
	12-9	2.5	Lead	8,710	200
	All samples		Lead	5,165.5 (Average)	
D	D-8	0.5	246TNT	13,900	33.67
	D-8	2.5	246TNT	1,400	33.67
	All samples		246TNT	7,650.0 (Average)	

Note: All samples taken on Aug. 1, 1991.
mg/kg = milligrams per kilogram.

Source: ESE.

Study Area D--The explosive 246TNT was detected in two samples at Study Area D; the concentrations varied between 1,400 and 13,900 ppm. The resultant risk for adult residents, based on the 95-percent upper confidence level (UCL95%) concentration of 40.4 ppm, is 2.2 in a million and the contributing HI based on exposure concentration for child residents is 1.2. The estimated volume of explosives-contaminated soil is approximately 5 yd^3. Arsenic exceeds background concentrations and the purely health-based clean-up level (0.37 mg/kg for a lifetime exposure) is below background (11.7 mg/kg, maximum concentration of AS in background). This is a sitewide occurrence which will be addressed in the final ROD for Area A. The exceedance of the HI for chromium is due to assumption that chromium is in the most toxic hexavalent form and that inhalation to dust is considered a significant pathway. Using standard default exposure assumptions for a residential child, taking into account that ingestion of soils is the primary exposure route to a child, a health-based RL of 390 mg/kg has been calculated. Because the maximum on-site concentrations as well as the exposure concentrations of chromium are well below this concentration, and the site is vegetated and thus, not amendable to producing dust 350 days per year, the current site concentrations do not suggest that chromium requires remediation.

Concentrations of 246TNT at Study Area D should be reduced to levels that are protective of human health and the environment. Using standard default lifetime residential exposure assumptions, a RL of 21 mg/kg for 246TNT has been calculated based on a target cancer risk level of 1 in a million lower bound of EPA's acceptable cumulative risk range of 1×10^{-6} to 1×10^{-4}.

Based on the results of the supplemental RI/RA/FS, the significant COCs at Study Areas 12 and D within the Area A Soil OU are lead and explosives (246TNT). The remediation levels for Study Areas 12 and D are as follows:

1. Lead-contaminated soils at Study Area 12 will be remediated to achieve a risk-based soil remediation level of 500 mg/kg.

2. 246-TNT contaminated soils at Study Area D will be remediated to achieve the risk-based soil 246-TNT concentration of 21 mg/kg.

Achieving the remediation levels at these areas would result in protection of human health and the environment, as the total risk from Study Area 12 and D COCs will be at or below one in a million cancer risk level, a noncarcinogenic HI would be at or below a value of 1, and an EQ would be at or below a value of 1. Table 11 presents the assumptions and calculations of the remediation levels for COC.

7.0 DESCRIPTION OF ALTERNATIVES

Four interim remedial action alternatives have been developed for the contaminated soils in the Area A at AAAP. Alternatives 1A, 1C, and 1D involve excavation of approximately 3,800 yd^3 of lead-contaminated soil from Study Area 12 and 5 yd^3 of explosives-contaminated soil from Study Area D. Alternative 1E presents the no-action alternative. A fifth alternative, Alternative 1B, was assembled in the supplemental RI/FS but was not retained beyond the preliminary screening of alternatives. A brief description of the retained early remedial action alternatives is presented in the following sections.

Table 11. ASSUMPTIONS USED IN CALCULATING REMEDIATION LEVELS FOR COCS

For carcinogenic effects (i.e. arsenic, and 246 TNT) used the following equation:

$$RL = \frac{TR \times AT[CARC]}{EF[res] \times (IFS[adj]/CF[so]) \times CSF[oral]}$$

Where:

TR = target risk (10[-6] unitless)
AT[carc] = averaging time for carcinogenic exposures (25,550 days).
EF[res] = exposure frequency (350 days/year).
CF[so] = soil convertion factor (10[6] mg/kg).
CSF[oral] = chemical-specific oral cancer slope factor [(mg/kg/day)[-1]].
IFS[adj] = soil ingestion factor, age adjusted (114.3 mg-yr/kg-day).

For noncarcinogenic effects (i.e. chromium) used the following equation:

$$RL = \frac{THQ \times RfD[oral] \times BW[c]\ AT[nonc]}{EF[res] \times ED[c] \times (IRS[c]/CF[so])}$$

Where:

THQ = target hazard quotient (1, unitless).
RfD[oral] = chemical-specific oral reference dose (mg/kg/day).
BW[c] = body weight, age 1-6, (15 kg).
AT[nc] = averaging time for noncarcinogenic exposures (EDc x 365 days/yr).
EF[res] = residential exposure frequency (350 days/year).
ED[c] = exposure duration, age 1-6 (6 yr).
IRS[c] = soil ingestion factor, age 1-6 (200 mg/day).
CF[so] = soil conversion factor (10[6] mg/kg).

7.1 Alternative 1A--Excavation and On-site Solidification/Stabilization of Contaminated Soil, On-site Disposal

Alternative 1A includes study area preparation followed by the excavation of all contaminated soils. No federal or state chemical-specific ARARs regulate cleanup; however, remediation levels have been established to meet health-based cleanup levels determined to be protective of human health. Approximately 5 yd^3 of 246TNT-contaminated soil in Study Area D will be excavated to meet the remediation level of 21 mg/kg and 3,800 yd^3 of lead-contaminated soil in Study Area 12 will be excavated to meet the remediation level of 500 mg/kg. Verification sampling will be performed to ensure that all soils exceeding the contaminant remediation levels have been removed.

Contaminated soils will be classified according to the Resource Conservation and Recovery Act (RCRA) [40 Code of Federal Regulations (CFR) Part 261] to determine if soils are a hazardous waste. Excavated soils would then be transported to a staging area for treatment by solidification/stabilization (if required) to comply with the land disposal restrictions in accordance with RCRA (40 CFR 262 and 264) and the State of Alabama regulations (Code of Alabama, Title 22, Chapters 27, 28, and 30). Stabilized material will be analyzed for lead and explosives to verify compliance with the following treatment standards:

- Lead-contaminated materials that result in a toxicity characteristic leaching procedure (TCLP) extract in excess of 5 milligrams per liter (mg/L) are considered hazardous. Explosives-contaminated materials that are ignitable or reactive are also considered hazardous. Solidified/stabilized material must not be ignitable or reactive, and must not exhibit a lead concentration greater than 5 mg/L in the TCLP to be disposed of.

Stabilized material meeting these criteria will be placed at an on site designated area in Area B. Clean soil will be used to backfill the excavations in Area A. The costs for excavating the contaminated soils and treating (by solidification/stabilization) are presented in the following cost estimate.

Estimated Construction Cost	$ 82,355
Estimated Operation and Maintenance (O&M) Cost	$ 303,600
Estimated Total Present-Worth Cost, including Engineering and Contingency	$ 414,779
Approximate Duration	1-2 weeks

7.2 Alternative 1C--Excavation and Off-site Disposal of Contaminated Soil

Alternative 1C includes study area preparation followed by excavation of all contaminated soils. No federal or state chemical-specific ARARs regulate cleanup; however, remediation levels have been established to meet health-based cleanup levels determined to be protective of human health. Approximately 5 yd^3 of 246TNT-contaminated soil in Study Area D will be excavated to meet the remediation level of 21 mg/kg and 3,800 yd^3 of lead-contaminated soil in Study Area 12 will be excavated to meet the remediation level of 200 mg/kg. Verification sampling will be performed to ensure that all soils exceeding the contaminant remediation levels have been removed.

Contaminated soils will be classified according to RCRA (40 CFR Part 261) to determine if soils are a hazardous waste. Excavated soils would then be transported to an approved hazardous waste landfill facility in Emelle, AL, for disposal in accordance with RCRA (40 CFR 262 and 264) and the State of Alabama regulations (Code of Alabama, Title 22, Chapters 27, 28, and 30).

Excavated soils will be analyzed for lead and explosives to verify compliance with the following standards:

- Lead-contaminated materials which result in a TCLP extract in excess of 5 mg/L are considered hazardous. Explosives-contaminated materials that are ignitable or reactive are also considered hazardous. Excavated soils must not be ignitable or reactive, and must not exhibit a lead concentration greater than 5 mg/L in the TCLP extract to be disposed of without further treatment.

Stabilized material meeting these criteria will be placed in the approved hazardous waste landfill without further treatment. The excavations in Area A will be backfilled with clean soil.

The costs for excavating, transporting, and disposing of the contaminated soils in a hazardous waste landfill are presented in the following cost estimate. Implementation of this alternative assumes that the contaminated soils will pass TCLP requirements for lead and not exhibit the characteristics of ignitability and reactivity for explosives. The costs for this alternative do not include treatment by solidification/stabilization if the soils do not meet these requirements.

Estimated Construction Cost	$ 1,007,453
Estimated O&M Cost	None
Estimated Total Present-Worth Cost, including Engineering and Contingency	$ 1,360,061
Approximate Duration	1-2 weeks

7.3 Alternative 1D--Excavation and Stockpiling of Contaminated Soil in Area B RMCSs

Alternative 1D includes study area preparation followed by excavation of all contaminated soils. No federal or state chemical-specific ARARs regulate cleanup; however, remediation levels have been established to meet health-based cleanup levels determined to be protective of human health. Approximately 5 yd[3] of 246TNT-contaminated soil in Study Area D will be excavated to meet the remediation level of 21 mg/kg and 3,800 yd[3] of lead-contaminated soil in Study Area 12 will be excavated to meet the remediation level of 200 mg/kg. Verification sampling will be performed to ensure that all soils exceeding the contaminant remediation levels have been removed.

Contaminated soils will be classified according to RCRA (40 CFR Part 261) to determine if soils are a hazardous waste. Excavated soils will then be transported to a temporary containment structure in Area B. The soil will not be transported off-site at any time during hauling. The excavated soil will remain in storage until the implementation of remedial actions for the Stockpile Soils Area OU. At that time, the contaminated soils of Study Areas 12 and D within the Area A Soil OU will be removed from the temporary storage structures and treated by incineration, followed by solidification/stabilization (if required), or stabilization only (if applicable) along with the stockpiled soils.

Contaminated soils will be transported to an on-site thermal treatment unit in Area B for incineration. Treated material will be analyzed for explosives and lead to verify compliance with the treatment criteria described in Sec. 10.0. Particulate emissions from the incinerator will be managed through the use of a standard air emissions control system. Routine analysis of stack gases will be conducted to ensure the processes are operating efficiently and within acceptable criteria. The explosives will be destroyed during the incineration process. If lead concentrations in the soil, the treated soil or fly ash exceed the allowable regulatory standards, that material will be solidified/stabilized in compliance with the Land Disposal

Restrictions in accordance with RCRA (40 CFR 262 and 264) and the State of Alabama regulations (Code of Alabama, Title 22, Chapters 27, 28, and 30).

Treated material will be placed at an on site designated area in Area B. The excavations in Area A will be backfilled with clean soil. The on-site incinerator will be removed from Area B upon completion of the project.

The cost for excavating, transporting, and treating the Area A soils is presented in the following cost estimate as estimated construction costs. No costs are included for mobilization/demobilization of the incinerator since remediation will take place at the same time as the Stockpile Soils Area OU and these costs have already been accounted for in the Stockpile Soils Area OU ROD. Also, since the selected alternative can be completed in a short time period, no periodic O&M costs associated with the incinerator were included.

Estimated Construction Cost	$ 1,215,024
Estimated O&M Cost	None
Estimated Total Present-Worth Cost, including Engineering and Contingency	$ 1,640,282
Approximate Duration	1-2 weeks

7.4 Alternative 1E--No Action

The no-action alternative is required to be included as stipulated by CERCLA/SARA. No remedial action will be performed in this alternative. The no-action alternative is a baseline against which other alternatives can be evaluated. Under this alternative, contaminated soil would remain in place in the identified study areas. The risks from the COCs would remain. No cost is associated with this alternative.

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

8.1 Threshold Criteria

Overall Protection of Human Health and the Environment

Upon completion of Alternatives 1A, 1C, and 1D, the contaminant concentrations in the soils in Study Areas 12 and D within the Area A Soil OU would be reduced to levels that are protective of human health and the environment through excavation, treatment, and disposal outside of Area A of contaminated soils from the Study Areas. Alternative 1E would not be protective of human health or the environment since contaminants would be left in the soils, and risks to the community, workers, and the environment would remain.

Compliance with ARARs

No federal or state chemical-specific ARARs regulate implementation of any of the alternatives. Soils will be remediated according to health-based cleanup levels determined to be protective to human health and the environment. Completion of Alternatives 1A, 1C, and 1D would achieve the health- and risk-based cleanup levels. With Alternative 1A, the contaminated soils would be treated and disposed of on site in a designated backfill area in Area B. Although implementation of this alternative does not reduce soil contaminants, remediation levels are met by disposing of treated soils outside of Area A. With Alternative 1C, the contaminated soils would be removed and transported to an off site location and disposed of. With Alternative 1D, the contaminants would be removed from Area A and transported to Area B for temporary storage and subsequent treatment. Alternative 1E would not achieve the remediation levels since the contamination would not be removed or destroyed.

The following location-specific ARARs may be applicable within AAAP:

1. Within 100-year floodplain

   - RCRA: 40 CFR 264.18(b)--Facility must be designed, constructed, operated, and maintained to avoid washout by a 100-year flood.

2 Within floodplain

   - Executive Order 11988; 40 CFR 6, App. A: Floodplain Management–-Requires actions to avoid adverse effects, minimize floodplain destruction, restore and preserve natural and beneficial values, and minimize impact of floods on human safety, health and welfare.

3. Wetland

   - Executive Order 11990; 40 CFR 6, App. A: Protection of Wetlands--Requires action to avoid adverse impact, minimize potential harm, and to preserve and enhance wetlands to the extent possible.

4. Within an area affecting stream or river

   - Fish and Wildlife Coordination Act [16 United States Code (USC) 661 et seq.]--Must take action to protect affected fish or wildlife resources, and prohibits diversion, channeling, or other activity that modifies a stream or river and affects fish or wildlife.

5. Critical habitat upon which endangered or threatened species depends

   - Endangered Species Act of 1973 (16 USC 1531 et seq.); 50 CFR 402--Requires action to conserve endangered or threatened species. Must not destroy or adversely modify critical habitat.

However, none of the location-specific ARARs are expected to apply to implementation of any of the alternatives being evaluated since all activities associated with the Area A Soil OU remediation would be conducted in areas located away from sensitive environment (i.e., the river, 100-year floodplain, or critical habitat).

The following action-specific ARARS may apply to implementation of these alternatives, excluding Alternative 1E (No Action):

1. Clean Air Act (CAA)

   - 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards--Establishes standards for ambient air quality to protect public health and welfare.

   - 40 CFR Part 61: National Emission Standards for Hazardous Air Pollutants--Sets emission standards for designated hazardous pollutants.

2. RCRA

   - 40 CFR Part 261: Identification and Listing of Hazardous Waste--Provides guidelines for classifying wastes as hazardous waste.

- 40 CFR Part 262: Standards Applicable to Generators of Hazardous Waste--Establishes standards for generators of hazardous waste.

- 40 CFR Part 264: Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities--Establishes minimum national standards which define the acceptable management of hazardous waste for owners and operators of facilities which treat, store, or dispose of hazardous waste.

3. Alabama Administrative Code (AAC)

- Chapters 13-1 through 13-7: Alabama Solid Waste Management Regulations–-Establishes minimum criteria for the processing, recycling and disposal of solid wastes and the design, location, and operation of solid waste disposal facilities.

- Chapters 335-3-1 through 335-3-14: Alabama Air Pollution Control Rules and Regulations--Sets emission standards and establishes permitting requirements for air pollutants.

- Chapter 335-14-5.15(4)(a)1: Performance Standards for Incinerators--Provides standards for the performance of incinerators. Incinerators treating hazardous wastes must provide at least 99.99 percent destruction efficiency for each principal organic hazardous constituent.

4. Code of Alabama

- Title 22, Chapter 27: Alabama Solid Waste Act--Establishes a statewide program to provide for the safe management of non-hazardous wastes.

- Title 22, Chapter 28: Alabama Air Pollution Control Act of 1971--Provides for a coordinated statewide program of air pollution prevention, abatement, and control.

- Title 22, Chapter 30: Alabama Hazardous Waste Management and Minimization Act--Establishes a statewide program to provide for the safe management of hazardous wastes, including hazardous waste generation, transportation, and land disposal.

5. ADEM

- Chapter 14-1: Alabama Hazardous Waste Management Regulations--Establishes standards which define the acceptable management of hazardous waste for owners and operators of facilities which treat, store, or dispose of hazardous waste.

8.2 Primary Balancing Criteria

Short-Term Effectiveness

Upon completion of remedial activities, Alternatives 1A, 1C, and 1D would satisfy the remedial action objectives. Residual soil concentrations in Study Areas 12 and D within the Area A Soil OU would be below the remediation levels. No significant risks to the community, the workers implementing remedial actions, or the environment are expected during implementation of these three alternatives, provided that proper safety precautions are taken. During the excavation phase of these alternatives, appropriate precautions, such as the construction of surface runoff controls and the proper containment and covering of excavated soils, would reduce impacts to the environment. During the transportation phase, appropriate RCRA and DOT guidelines for transporting hazardous wastes would be followed to reduce impacts to the environment and the community. Primary risks to workers would be reduced by wearing protective clothing, designating exclusion zones for excavation areas, and adhering to proper decontamination procedures.

It is expected that each of these alternatives could be completed in less than 2 weeks. Based on a comparison of these three alternatives, no difference exists in their short-term effectiveness. Alternative 1E would present unacceptable risks to human health and the environment since no remediation of the contaminated soils would occur; therefore, this alternative would not be effective in the short term.

Long-Term Effectiveness and Permanence

Alternatives 1A, 1C, and 1D would be effective in reducing the long-term risk of exposure at Study Areas 12 and D within Area A. With these alternatives, the magnitude of residual risks will be removed as all of the contaminants are excavated and removed from Study Areas 12 and D within Area A. No treatment residuals or untreated wastes would remain in Study Areas 12 and D within Area A following completion of this interim action. Alternative 1A would be effective due to the removal of the contamination sources from Study Areas 12 and D within Area A and subsequent treatment of the contaminated soils in Area B. Alternative 1C would facilitate the removal of contaminated soils from Study Areas 12 and D within Area A for off-site disposal with no further treatment. Although Alternative 1D would not result in immediate treatment of the soil contaminants, the direct exposure pathways would be eliminated until the soils could be treated along with the Stockpile Soils Area OU soils. No long-term management of treatment residuals would be required. The effectiveness of the treatment methods has been demonstrated for similar wastes. Alternative 1E would not be effective in the long term since the contamination sources would remain intact, yielding no reduction in the unacceptable pathways or associated risks.

Reduction of Contaminant MTV

Alternative 1A would reduce the mobility of the contaminants of concern in Study Areas 12 and D within the Area A Soil OU; however, soil toxicity will not be reduced and the total volume of contaminated material is expected to increase by approximately 30 percent. Alternatives 1C and 1D would reduce on-site MTV within Study Areas 12 and D within Area A. However, overall toxicity or volume of contaminated material would not be reduced since the soil would only be transferred from one location to another. Under Alternative 1D, treatment of the contaminated soils along with the Stockpile Soils Area OU would result in a significant decrease in toxicity and a slight decrease in volume of material. Because the contaminants in the soils would not be destroyed, removed, or treated under Alternative 1E, the MTV of the contaminants would remain unchanged.

Implementability

Alternatives 1A, 1C, 1D, and 1E are technically and administratively feasible. Alternatives 1A, 1C, and 1D are all implementable, with required labor, equipment, and materials available from various suppliers near AAAP. Alternative 1A would be more difficult to implement than Alternatives 1C or 1D since this alternative requires special equipment and operators as well as additional site preparation and system mobilization prior to remediation. Alternative 1D would be the most easily implementable since this alternative does not require off-site transportation, and treatment of the contaminated soils could be performed when the treatment system for the Stockpile Soils Area OU has already been mobilized. No remedial actions would be implemented for Alternative 1E.

Cost

The total present-worth costs of remediation, based on 1992 unit costs, are $415,000 for Alternative 1A; $1,360,000 for Alternative 1C; and $1,640,000 for Alternative 1D. These costs include construction costs, O&M costs, engineering, and contingency fees. Additionally, the cost for Alternative 1D includes treatment of the contaminated soils at the appropriate time when stockpiled soils are being treated. No cost is associated with Alternative 1E.

8.3 Modifying Criteria

ADEM/EPA Acceptance

EPA and ADEM have concurred with the choice of Alternative 1D.

Community Acceptance

Public comments on the selected remedial action were minimal. The majority of the comments requested additional information on the types, volumes, and locations of contaminants; the safety of workers and residents; and the timely implementation of the remedial action. All of these comments have been addressed. The public appears to have no concerns about the implementation of the selected remedy.

9.0 SELECTED REMEDY AND REMEDIATION LEVELS

The selected alternative (Alternative 1D) calls for implementing an interim remedial action to protect human health and the environment from the contaminated soil in Study Areas 12 and D within the Area A Soil OU at AAAP. This action is an interim action for only the contaminated soils in Study Areas 12 and D within the Area A Soil OU. Treatment of the Area A Soil OU soils will commence with the Stockpile Soils Area OU soils treatment. A final remedy for the remaining portions of AAAP will be proposed following the completion of other RI/FS efforts currently in progress.

Based on the CERCLA requirements and the detailed analysis of the alternatives, AAAP, in consultation with EPA and ADEM, has determined that Alternative 1D is the most appropriate remedy for soils in Study Areas 12 and D within the Area A Soil OU.

The interim remedy for soils in Study Areas 12 and D within the Area A Soil OU for source control includes:

- Excavation of approximately 3,800 yd^3 of lead-contaminated soils from Study Area 12 and 5 yd^3 of explosives-contaminated soils from Study Area D

- Transportation of contaminated soils to Area B and storage along with the Stockpile Soils Area OU soils in RMCSs

- On-site treatment (in Area B) by incineration followed by solidification/ stabilization (if required) or solidification only (if applicable) of contaminated soils along with the Stockpile Soils Area OU soils.

- On-site disposal of treated soil at a designated area in Area B

The cost of the selected remedy is presented next. The cost for excavating and incinerating the Area A soils is presented in the following cost estimate. No costs are included for mobilization/demobilization of the incinerator since remediation will take place at the same time as the Stockpile Soils Area OU and these costs have already been accounted for in the Stockpile Soils Area OU ROD. Also, since the selected alternative can be completed in a short time period, no periodic O&M costs associated with the incinerator are expected to be realized.

Estimated Construction Cost	$ 1,215,024
Estimated O&M Cost	None
Estimated Total Present-Worth Cost, including Engineering and Contingency	$ 1,640,282

The remediation level for excavation of 246TNT-contaminated soil at Study Area D in Area A is 21 mg/kg. The remediation level for excavation of lead-contaminated soil at Study Area 12 in Area A is 200 mg/kg.

Lead-contaminated materials which result in a TCLP extract in excess of 5 mg/L are considered hazardous under RCRA. Explosives-contaminated material that is ignitable or reactive is considered hazardous waste under RCRA.

Implementation of the selected interim action will result in the removal from Study Areas 12 and D within Area A of all contaminated soils at concentrations above the remediation levels of 21 mg/kg for 246TNT and 200 mg/kg for lead, resulting from DOD operations. Implementation of the selected remedy will also meet the following standards for treating the COCs in the excavated soils from soils in Study Areas 12 and D within the Area A Soil OU:

- Explosives--The ash generated from the incineration of explosives-contaminated soil will be tested for destruction of explosives, as required by RCRA. A treatment standard for 246TNT of 1 microgram per gram (g/g) will be used to demonstrate destruction.

- Lead--Concentration of less than 5 mg/L in the TCLP extract, as required by RCRA.

- Particulate Emissions--Routine analysis of stack gases will be performed to ensure processes are operating efficiently and within acceptable air emissions standards for the state of Alabama.

- Confirmatory sampling along with remediation will be conducted to include broad scan analyses, following the remediation to ensure that all contaminants of concern resulting from DOD operations that would pose a risk to public health or the environment have been addressed.

10.0 STATUTORY DETERMINATIONS

The selected alternative satisfies the requirements under Sec. 121 of CERCLA to:

- Protect human health and the environment

- Comply with ARARs

- Be cost effective

- Use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable

- Satisfy the preference for treatment as a principal element.

10.1 Protection of Human Health and the Environment

The selected alternative protects human health and the environment through excavation, treatment, and disposal of contaminated soils from Study Areas 12 and D within the Area A Soil OU.

During remediation activities, adequate protection will be provided to the community by reducing the short-term risks posed by air emissions from the thermal treatment unit and reducing dust potentially generated during material excavation and handling activities. In addition, workers will be provided with personal protection equipment during all phases of remediation activities.

Long-term protection to human health and the environment will be provided by leaving no residual risk from the DOD-related contaminants and reducing or eliminating the impact on the environment.

Controls employed in the alternative are adequate and reliable. This alternative has no unacceptable short-term or long-term impacts on human health or the environment.

10.2 Compliance with ARARs

The selected alternative complies with all ARARs. All the COCs in soils of Study Areas 12 and D within the Area A Soil OU (i.e., explosives and lead) are expected to meet required regulatory treatment/disposal standards prior to disposal.

No federal or state chemical-specific ARARs prevent implementation of the selected alternative. Soils will be remediated based on health-based cleanup levels determined to be protective to human health and the environment. Lead-contaminated soils will be remediated to achieve the health-based soil lead concentration of 200 mg/kg (based on blood-lead uptake levels in children). Soils contaminated with 246TNT will be remediated to achieve the health-based soil 246TNT concentration of 21 mg/kg (based on the resultant risk for adult residents and the contributing HI due to exposure concentration for child residents).

No location-specific ARARs prevent the use of the selected alternative. All activities associated with implementation of this alternative will be conducted away from sensitive environment (i.e., river or 100-year floodplain).

The following action-specific ARARS will be met with implementation of this alternative:

- Incinerator ash will be routinely tested for destruction of explosives, as required by RCRA (40 CFR Part 264: Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities) and the state of Alabama (Alabama Administrative Code Chapter 335-14-5.15(4)(a)1: Performance Standards for Incinerators)

- TCLP extract analysis on incinerator ash will be performed to ensure lead concentrations in the treated soil are less than 5 mg/L prior to disposal, as required by RCRA (40 CFR Part 264: Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities). Incinerator ash that does not pass TCLP will be solidified/stabilized prior to disposal.

- Incinerator ash and solidified/stabilized material (if required) will be disposed of on site in Area B in accordance with RCRA (40 CFR Part 264: Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities) and the State of Alabama (Code of Alabama, Title 22, Chapter 27: Alabama Solid Waste Act and Alabama Administrative Code Chapters 13-1 through 13-7: Alabama Solid Waste Management Regulations).

- Routine analysis of stack gases will be performed to ensure incinerator processes are operating efficiently and within acceptable air emissions standards, as required by the CAA (40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards and 40 CFR Part 61: National Emission Standards for Hazardous Air Pollutants) and the State of Alabama (Code of Alabama, Title 22, Chapter 28: Alabama Air Pollution Control Act of 1971 and Alabama Administrative Code Chapters 335-3-1 through 335-3-14: Alabama Air Pollution Control Rules and Regulations).

- Workers will be provided with personal protection equipment during all phases of the selected remedy, in compliance with the Occupational Safety and Health Act (OSHA) (29 USC ss. 651-678). Adequate protection will be provided to the community by reducing risks posed by air emissions from the thermal treatment unit and reducing dust potentially generated during material excavation and handling activities.

If the excavated soils are determined to be a hazardous waste, the following action-specific ARARS would be applicable:

- Wastes will be properly classified under guidelines for RCRA (40 CFR Part 261: Identification and Listing of Hazardous Waste and 40 CFR Part 262: Standards Applicable to Generators of Hazardous Waste) and the State of Alabama (Code of Alabama, Title 22, Chapter 30: Alabama Hazardous Waste Management and Minimization Act and ADEM Chapter 14-1: Alabama Hazardous Waste Management Regulations).

10.3 Cost Effectiveness

The selected remedy for soils in Study Areas 12 and D within the Area A Soil OU has been determined to provide overall effectiveness proportionate to its costs. Although this alternative is more expensive than Alternatives 1A and 1C, it takes advantage of the special equipment, operators, site preparation, and treatment system mobilization already in place for treatment of the Stockpile Soils Area OU. The estimated total present-worth cost for the selected alternative is $1,640,000.

10.4 Use of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The selected interim action is not designed or intended to be a final action for all soils within the Area A operable unit but rather is intended to address only the soils within Study Areas 12 and D of the operable unit. As such, the alternative meets the statutory requirements to use permanent solutions and treatment technologies to the maximum extent practicable to achieve remediation goals at only these two study areas. The criteria used in selecting the alternative include:

- Short-term Effectiveness: The selected alternative does not involve off-facility transportation of contaminated soils, thereby eliminating the risks to the community due to spillage and dust emissions. The community, workers, and environment will be protected during remedial actions by implementing appropriate protective measures.

- Long-Term Effectiveness and Permanence: The selected alternative provides for remediation of contaminated soils from Study Areas 12 and D within the Area A Soil OU. Direct exposure pathways would be eliminated until the soils can be remediated with the Stockpile Soils Area OU. Upon treatment, the magnitude of residual risks will be removed as all of the contaminants are treated and disposed of in accordance with applicable regulations.

- Reduction of Contaminant MTV: Contaminant mobility would be significantly decreased due to the placement of the contaminants in lined storage buildings. Contaminant toxicity and soil volume would be reduced upon treatment along with the Stockpile Soils Area OU.

- Implementability: All elements of the selected alternative are performed on site. Required labor, equipment, and materials are available from various suppliers near AAAP. Treatment of contaminated soil will not require any additional special equipment or system mobilization since these components will already be in place for the Stockpile Soils Area OU.

- Cost: While the selected remedy is more expensive, it takes advantage of special equipment and thermal treatment system mobilization costs which will be incurred during treatment of the Stockpile Soils Area OU.

10.5 Preference for Treatment as a Principal Element

The selected interim action utilizes treatment for the soils of Study Areas 12 and D within the Area A Soils Operable Unit. Any additional required actions for these two Study Areas as well as for all the soils of the operable unit will be addressed in the final Decision Document for the Soils of the Area A Operable unit.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The selected alternative (Alternative 1D) is the preferred alternative presented in the Proposed Plan. Subsequent discussion between AAAP, EPA, ADEM, USACE, and AEC led to a decision to limit the scope of actions to Study Areas 12 and D only. Additional investigations will determine if additional actions are required in any other areas of the Area A soils operable unit.

RESPONSIVENESS SUMMARY

1.0 OVERVIEW

The public reaction to the selected remedy is mainly acceptance. The majority of the comments requested additional information on the types, volumes, and locations of contaminants; the safety of workers and residents; and the timely implementation of the remedial action. All of the public comments have been addressed, and the public appears to have no concern about implementation of the selected remedy. Continued community relations activities will be held to maintain public awareness of the status of remedial activities at AAAP.

2.0 BACKGROUND ON COMMUNITY INVOLVEMENT

General community interest in the AAAP site has historically not been great. Since the site was declared excess to Army needs in 1973, more interest has come from private groups or industry hoping to develop portions of the site. The southern part of the site (i.e., the former nitrocellulose manufacturing area) was sold to the Kimberly Clark Corporation in the late 1970s, and a paper products plant was constructed. In the mid-1980s, in response to interest in purchasing the eastern part of AAAP (Area A), this section was remediated by the Army and the contaminated soil was stockpiled in the western part of AAAP (Area B), creating the Stockpile Soils Area OU. A ROD for treatment [i.e., incineration followed by solidification/stabilization (if required)] of the Stockpile Soils Area OU soils has been signed.

Post-excavation sampling was performed to verify the remediation efforts within Area A, and two sites (Study Areas 12 and D) were subsequently identified as containing contamination above acceptable levels. A supplemental RI/FS was performed to determine the extent of the additional contamination and to select a remedial action. Studies to find the existence and extents of contamination in Area A have been published in the local libraries.

Notice of the public comment period and meeting for the Area A Soil OU was placed in four local newspapers on March 30, 1993, and the public comment period extended from April 1 through April 30, 1993. No written public comments were received. The public meeting was held on April 20, 1993, at the Central Alabama Community College, located about 5 miles from the AAAP site. The questions asked were mainly to obtain more detailed information on the identified contamination and the proposed remedy.

3.0 SUMMARY OF PUBLIC COMMENT AND AGENCY RESPONSE

At the public meeting held on April 20, 1993, the public was given the opportunity to comment and ask questions about the Proposed Plan. The following is a summary of the questions/comments raised by the public and Army/regulators' responses given at the meeting, and supplemental answers, where applicable:

Q1.   How big of an area is Area 12?

Answer at the meeting: (USAEC) Probably no more than about several acres. It is not a very big area. It is big in comparison to some of the others, but about several acres.

Answer at the meeting: (AAAP) If you note this area right here is Area A in its entirety and consists of about 2,700 acres. This area right here is Area 12. This looks like maybe 30 or 40 acres.

Q2.   What are the contaminants?

Answer at the meeting: (USAEC) At Area 12, the contaminant is lead and we did find some small amounts of explosive in that soil, but, again, the lead is causing us to remediate.

Q3. This is the old burning ground?

Answer at the meeting: (USAEC) Yes.

Q4. What about the chromium content?

Answer at the meeting: (USAEC) We did not find any chromium there that was basically in excess of natural conditions.

Q5. I am under the impression that you found lead, B2EHP, chromium, 13DNB, 24DNT, 26DNT, iron, lead, in trace amounts or what?

Answer at the meeting: (USAEC) Very low amounts, yes. The only one of those that was at a level of concern was the lead. All of the others were found in very trace levels.

Q6. Does the cost of Alternative D include the remediation of the soil after it is removed?

Answer at the meeting: (USAEC) Yes, it does, that is included in the estimate, and we consider that a conservative estimate also. It conceivably could be less than that.

Answer at the meeting: (AAAP) The whole estimate there is based on a conservative figure. In other words, the feeling is it would probably be a lesser amount of material and a lesser cost.

Q7. Under 29 CFR 1910.120 would this be a 40 hour HAZMAT trained employee?

Answer at the meeting: (USAEC) Yes.

Q8. Will Weston Services be doing this remediation or would a local contractor be doing it?

Answer at the meeting: (USAEC) Certainly, the incineration will be done under the contract with Weston Services. It is envisioned that probably the removal of the soil would be a modification to the contract, but certainly, it would be open to suggestions.

Our intent is to modify the contract, but that has not occurred yet, obviously because there has been no decision on this remediation.

Q9. Under 1910.120, would this be a Level D, C, B, A, whatever?

Answer at the meeting: (ESE) I think that would have to be determined when they develop the safety plan.

Answer at the meeting: (USAEC) Yes, I think that has got to be determined at that time.

Q10. A site safety plan has not been developed, you are just talking about the feasibility study now?

Answer at the meeting: (USAEC) Right, we are proposing this. Once it is approved, once the Record of Decision is signed that is basically saying, 'Yes, we have decided and everybody has concurred that we will do this remediation, the action that we have described.' At that point then we would make site safety plans and all and look at and determine the appropriate level of protection.

Q11. What is the basis for the 200 part per million cleanup standard for lead in the soil?

Answer at the meeting: (ESE) That is a risk-based number based on risk assessment. I can verify that, but I believe that was based on risk assessment.

Answer at the meeting: (USAEC) That is considered a risk base level, that at 200 parts per million of lead, there is a risk that would be involved in being exposed to that amount.

Q12. It is not based on an RCRA corrective action level for lead?

Answer at the meeting: (ESE) No, it would be risk-based.

Answer at the meeting: (USAEC) Yes, risk.

Answer at the meeting: (ADEM) For an individual complex, EPA guidance usually has a cleanup level of 500 to 1,000 parts. This is definitely a risk.

Q13. Do you know what the RCRA corrective action level in soils for lead is?

Answer at the meeting: (USAEC) I do not remember.

Supplemental Answer: (ESE) There is no RCRA corrective action level in soils for lead.

Q14. To what depth is this 3,800 cubic yards? Is it six to eight inches over the entire surface?

Answer at the meeting: (USAEC) It is about 3 ft. We are estimating basically 3 ft deep. That is why I am saying we are conservative, because it may not go down 3 ft in all places, but we think it is no deeper than that.

Q15. I was wondering, you were talking about there were explosives and things in Area 12?

Answer at the meeting: (USAEC) Yes, very small amounts. The gentleman, when he listed those compounds, some of those are explosives and they were found in very small amounts, though.

Q16. I was wondering in transporting that to the storage area, it would have to be first excavated, dug up and loaded. What are the dangers involved that something might happen that they might explode or anything like that?

Answer at the meeting: (USAEC) Really, none. This soil is not reactive, reactive meaning that it could be detonated or burned. And this soil will not detonate and it will not burn, so there is no risk in that regard.

Q17. You said five cubic yards, right?

Answer at the meeting: (USAEC) Of the explosive soil, yes. That is the soil from Area D. We are talking about two pieces of soil. The soil from Area 12 is about 3,800 cubic yards. The soil from Area D, which is just south of Area 12, is only about 5 cubic yards and that is the soil that we found explosives in the soil above criteria.

Again, even though they are above criteria, they are still not considered reactive. They will not detonate and will not burn.

Q18. I live on the property and I represent the owner of the site they are talking about. I ran a disk harrow over it Wednesday and I am still here. I am not dead. We did not know exactly where the site was until now. And so, it is not -- I did not blow up or anything. It cannot be too bad.

But our position is when we bought the property, we were under the impression that, and by contract, that the site was clean, and we just want to enforce that it gets cleaned up, because especially from a personal standpoint, me living on the property, I do not want any risk. I am probably the only person who lives on the property of the whole ammo plant. And being there all the time, I have not been sick or anything else. But on the company standpoint, we bought something clean and we want it clean and the government is very good about working out and we have had no problems so far.

I want to assure you we have worked with the government and they have worked with us and there is no problems with everything being expedient. You know, we have the most concern of everybody because we are on the property every day and we have had no problem from the government. Like I say, they have helped us.

Answer at the meeting: An answer to this statement was not necessary.

Q19. When did you find this additional soil in Area 12 and D?

Answer at the meeting: (USAEC) It was found from studies done during the summer of 1991.

Q20. Up until that time you had assumed that all of the land that they had bought had been remediated?

Answer at the meeting: (USAEC) Right, we had remediated and we felt that based on what we had done that we had cleaned the property. And then we were asked to do some additional investigation and we found these two pieces. As we agreed and said we would do--if we found anything additional, we are removing it. I would like to say that this removal action and incineration will be a final action regarding the soil at Area A.

Supplemental answer: If additional actions are required following the proposed interim action, these actions will be presented in the final ROD.

Q21. You said you did representative sampling? But you said you did not know whether it went below three feet or not. Did you not drill below three feet in the boring?

Answer at the meeting: (USAEC) Yes, we did representative sampling, but you do not go down three feet on every inch of the property. So what we are saying is we found it no deeper than three feet, but it could be three feet here and it could be a lot less over here. When we are estimating volume, we are taking basically a cylinder or a volumetric shape out and saying that all of that is contaminated soil. All I am saying is when we do verification sampling, which will be basically sampling the soil as it is removed, we will remove all that has to be removed until it is below criteria.

Q22. Have you done any groundwater sampling? Did you find anything in that?

Answer at the meeting: (USAEC) Yes, we have done groundwater sampling. We have found nothing in Area A above criteria or at any levels requiring any response action, and we are going to be doing some additional sampling and investigation of the groundwater at Area A to confirm that, to ensure the owners that this property is indeed clean.

4.0 REMAINING CONCERNS

All of the public comments have been adequately addressed. The public appears to have no concerns about the implementation of the selected remedy.

COMMUNITY RELATIONS ACTIVITIES AT AAAP

This section is incomplete until the Public Comment Period and Public Hearing have been completed and all questions addressed. Once the Public Comment Period is concluded, this section will be incorporated into the document.

To date, communication with community members regarding past and ongoing environmental studies at AAAP has consisted of the following:

1. A public meeting was held in April 1985 to announce plans to conduct an RI/FS study at AAAP.

2. A public meeting was held in September 1986 in Childersburg, AL to brief the public on a (a) the findings of the completed RI, (b)the initiation of the Area A decontamination and/or cleanup effort, and (c) the status of the ongoing FS.

3. Mr. Ronnie Wynn, AAAP caretaker, spoke to the Sylacauga Rotary Club in July 1990 on the status of AAAP. Mr Wynn has also offered site tours to interested citizens in the AAAP community.

4. Community interviews were conducted with community leaders and residents adjacent to AAAP (July 23 through 26, 1990).

5. A public meeting was held at Central Alabama Community College in August 1991 to discuss the results of the site-wide RI.

6. A public comment period on the Proposed Plan for the Stockpile Soils Area Operable Unit was held from November 21, 1991 to December 23, 1991.

7. A public meeting was held at Central Alabama Community College on December 5, 1991 to discuss the Proposed Plan for the Stockpile Soils Area Operable Unit.

8. A public comment period on the Proposed Plan for the Area A Soil Operable Unit was held from April 1, 1993, to April 30, 1993.

9. A public meeting was held at Central Alabama Community College on April 20, 1993, to discuss the Proposed Plan for the Area A Soil Operable Unit.

Other communication techniques the Army has used to provide the public and media with updated information on AAAP include producing fact sheets, mailing out news releases and letters of invitation, providing site tours, and storing AAAP documents in repositories for public review.

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